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ABSTRACT

Relationships between "combinatorial" abilities in language, symbolic play, blockbuilding, and non-semantic action sequences were explored in a study of 30 infants between 82 and 91 weeks of age. Subjects were observed in a laboratory playroom setting for approximately 45 minutes. During this time, a number of tasks were administered which were aimed at assessing the child's ability to combine his or her actions into sequences. For each of four target objects, two scenarios were modeled: one involved an appropriate exemplar of a target object (Doggie, Cup, Car, or Fiffin, a novel concept), and the other involved an inappropriate object which was substituted for the target object (e.g., a flashlight as a doggie). Additionally, the experimenter modeled meaningless actions and constructed four block structures. The children's utterances during the entire session were transcribed. Data on infants' "combinatorial" abilities were obtained in five domains: symbolic play with appropriate objects, symbolic play with inappropriate objects, non-semantic action sequences, blockbuilding, and language. Two independent transcripts were made of each child's utterances and play. Only those behaviors agreed upon by two raters were included in the analyses. Results are discussed. (Author/RH)

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Cognitive Correlates of Early Multiword Speech

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Until 18-24 months, children speak in single words, even though sentence-like relational meanings, sentence-like intonational contours, and the ability to produce several syllables are all apparently available to them (e.g., Branigan, 1979; Greenfield & Smith, 1976; Rodgon, 1976). The nature of the transition to multiword speech is unclear--whether it is language-specific, and if not, what cognitive capacities may underlie it.

At about the same time as children begin to create their first word combinations, combinatorial abilities are beginning to appear in other domains: symbolic play (Nicolich, 1977; Fenson & Ramsay, 1980), blockbuilding (Case & Khanna, 1981; Greenfield, 1978), and imitation of complex non-semantic action sequences (McCall, Parke & Kavanaugh, 1977). On the basis of similar onset times, these and other authors have suggested that the transition to multiword speech may involve a more general cognitive advance, such as greater memory span.

The present study explored the relationship between combinatorial abilities in language, symbolic play, blockbuilding, and non-semantic action sequences, including an assessment of working memory used by Case and Khanna.

ProcedureSubjects

Thirty children between 82 and 91 weeks, 15 boys and 15 girls, were observed in a laboratory playroom setting. The sessions lasted approximately 45 minutes. During this time, a number of tasks were administered which were aimed at assessing the child's ability to combine his/her actions into sequences.

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Tasks

Symbolic play. For each of four target objects, two scenarios were modeled: one which involved an appropriate exemplar of a target object (doggie, cup, car, or fiffin--a novel concept, after Nelson & Bonvillian, 1978), and another in which the target object was substituted for by an inappropriate object (e.g., using a flashlight as a doggie). See Figure 1 for the scenes and materials.

Non-semantic actions. The experimenter modeled a series of actions in which a plastic ring was banged with a block, spun, then stacked on a dowel stick.

Blockbuilding. The experimenter modeled four structures: a two-block tower, a "train" of three blocks in a right angle, a three-block arch, and a "train" plus an extra block in front. See Figure 2 for sketches of the structures.

Language. In addition, the children's utterances during the entire session were transcribed.

Videotape Coding and Measures.

Two independent transcripts were made of the child's utterances and play. Only behaviors which were agreed upon by two raters were included in analyses.

Combinatorial measures. For the symbolic play and non-semantic play tasks, the stream of behavior was segmented into units which roughly correspond to utterances. A segment was considered to end when the child 1) indicated s/he was through with the toys, 2) engaged in social interaction, or 3) engaged in irrelevant activities. On each trial, the child received spontaneous and elicited scores on two measures: 1) number of different schemes in longest chain; and 2) number of pairs of actions in modeled order, regardless of whether they were separated by interruption.

Block scale. The children spontaneously created two structures which were not modeled: the two-block row, and the "inverted" train or arch, which they held up with their hands. These plus the modeled structures formed a Guttman scale. The children were therefore scored on the number of different block structures they created.

Language. The observed corpora were used to obtain several language measures, including total number of multiword utterances and MLU (Brown, 1973).

Summary

To summarize so far, we are interested in children's ability to combine their actions and words. We have obtained combinatorial measures in five domains: symbolic play with appropriate objects, symbolic play with inappropriate objects, non-semantic action sequences, blockbuilding, and language. The question is whether relationships will appear between combinatorial abilities in these various domains.

Results

The results are summarized in Table 1. First, with one exception, there were no cross-domain correlations among spontaneous measures. The exception, as we'll discuss more in a moment, is the relationship between spontaneous combinations in symbolic play with appropriate objects and spontaneous combinations in the non-semantic task. Therefore, the table concentrates on elicited play variables.

Language measures (total number of multiword utterances, and MLU) were related to combinations and ordering measures in symbolic play with appropriate objects.

These latter two domains (appropriate symbolic play and the non-semantic task) were unrelated to any other measure in elicited play. However, they were related to each other in a spontaneous play.

A Venn diagram is presented along with the table which summarizes these relationships.

Discussion

One group of variables seems to be made of combinations in language, blocks, and symbolic play with inappropriate objects, while the other group is made of combinations in symbolic play with appropriate objects and non-semantic actions.

Since previous work in Bates & Bretherton's lab had suggested that relationships with language were stronger for play with inappropriate objects than appropriate objects (Bates, Bretherton, Snyder, Shore & Volterra, 1980; Shore, O'Connell & Bates, Note 1), that result was expected.

What was puzzling was the relationship between symbolic play with appropriate objects and non-semantic actions. Why should it be the case that representing real-world events in play would be correlated with sequences of completely meaningless actions? One clue might be that this was a relationship between spontaneous combinations in these two domains--the children had not yet seen the experimenter's model. The children had anticipated the sequences to be performed with the objects. It seems that such combinations may "come naturally" to 20-month-olds, they are likely to be practiced, routine, relatively unconsidered.

By contrast, treating a flashlight as a doggie, making primitive sentences, and creating block structures seem to require more deliberation. Chances are that the child did not have a ready made routine for flashlights as doggies. With the exception of one child whose corpus was largely made up of repetitions of the same phrase, most of the children's multiword utterances also seemed to take some dexterity and coordination.

It seems that two kinds of combinatorial activities are present near the end of the second year--those which are unconsidered, spontaneous and

relatively automatic, and those which are more considered, deliberate and attention demanding. Early word combinations in this sample were related to combinatorial activities of the latter sort suggesting that the short term memory for organizing and planning a series of separate actions may contribute to the transition to multi-word speech.

Future work is planned to investigate the developmental course of these two hypothesized types of combinations, and to investigate possible style differences among children in their reliance on types of combinatorial action.

Reference Notes

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Appropriate	Inappropriate
DOGGIE Leash Bowl	FLASHLIGHT Leash Bowl
Doggie scene: Put the leash on the doggie, hug doggie, make doggie eat from bowl	
CUP Pitcher Saucer	COMB Pitcher Saucer
Cup scene: pour into the cup, drink from cup, set cup on saucer	
CAR Doll Gas station	BEAD NECKLACE Doll Gas station
Car scene: put doll in car, drive car, get gas in car	
FIFFIN fuzzy crook tube + bolt object	SHOE fuzzy crook tube + bolt object
Fiffin scene: get fiffin with crook, "gloop" fiffin, touch fiffin to tube + bolt object	

Figure 1. Symbolic Play scenes, administered in semi-random order. For each trial, C scored on # of different actions put together without interruption, and number of pairs of actions in modelled order.

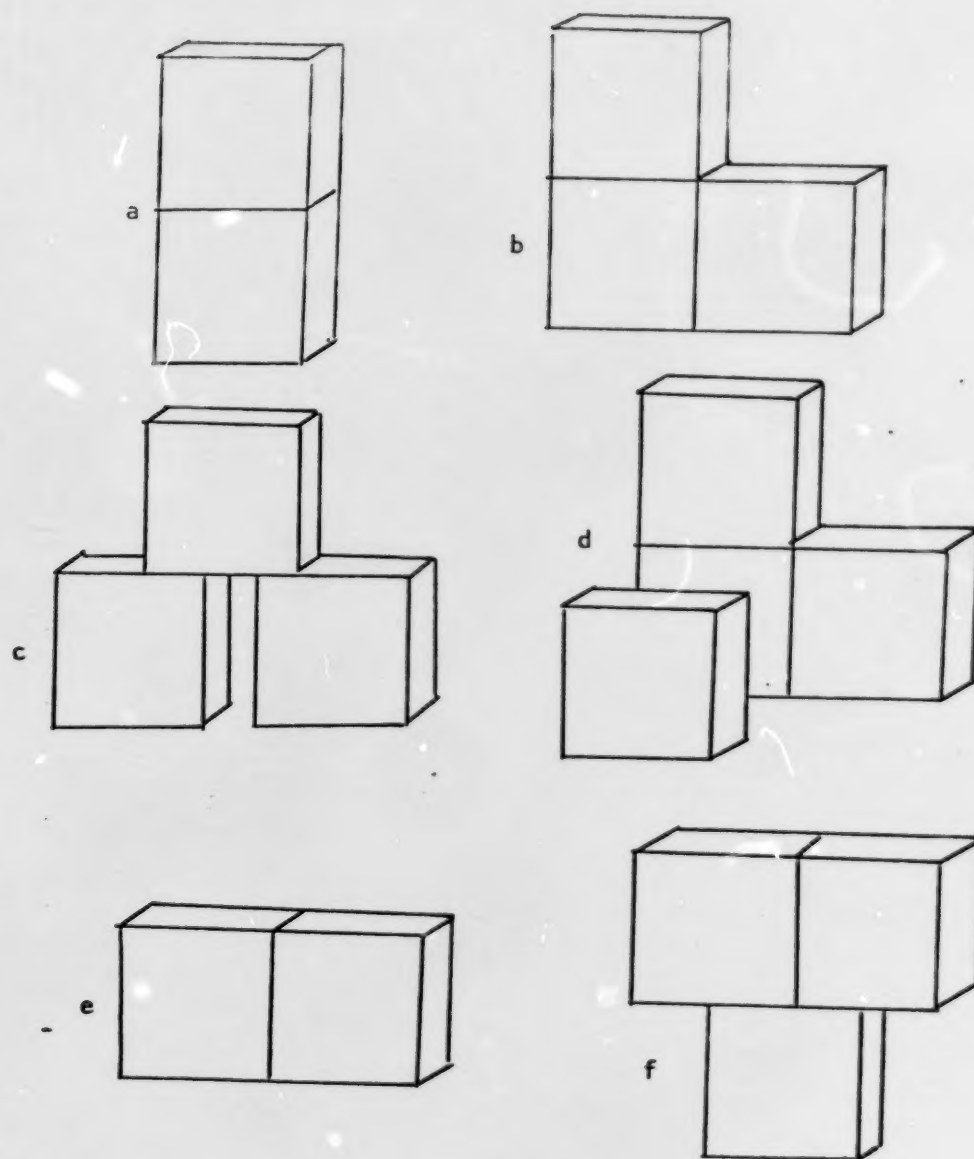


Figure 2. Block structures: a) through c) were used by Case and Khanna (1981), a) through d) were modelled by the experimenter, e) and f) were spontaneously created by subjects.

Table 1

	Word Combinations		App. Symb. Play		In. Symbolic Play		N.Sem. Actions		Blocks
	Tot	Brown	Dif sch	Pairs	Dif sch	pairs	Dif sch	pairs	# dif
	MW utts	MLU	in chain	in order	in chain	in order	in chain	in order	struct.
total # MW utts	1.0	.90*	ns	ns	ns	.37*	ns	ns	.40*
Brown MLU		1.0	ns	ns	.41*	.38*	ns	ns	ns
Ap. # dif sch in chain			1.0		ns	ns	SP .47*	ns	ns
Ap. # pairs in order				1.0	ns	ns	.48*	.37*	ns
In. # dif sch in chain					1.0		ns	ns	ns
In. # pairs in order						1.0	ns	ns	ns
NS # dif sch in chain							1.0	.72*	ns
NS # pairs in order								1.0	ns
# dif blk structures									1.0

